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Weyerhaeuser



Date March 21, 2000
From John Gross
Location CH 1K29
Subject Weyerhaeuser Chlor-Alkali Facility Feasibility Study Scope of Work
To Cris Matthews
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APR 01 2000
Environmental Literacy Office

Purpose

The Washington Department of Ecology (Ecology) and Weyerhaeuser Company are entering into an Agreed Order for a Feasibility Study (FS) for Weyerhaeuser's Chlor-Alkali Facility in Longview, Washington. The FS will be completed under the authority of the Model Toxics Control Act (MTCA) (Chapter 173-340 WAC). The Order is currently available for review and public comment through February 11, 2000.

This memorandum presents a summary of the current environmental conditions at the site and the conceptual scope of work to be pursued during the Weyerhaeuser Longview Chlor-Alkali FS. The purpose of this memorandum is to keep a record of the progress made to date in defining the environmental conditions at the site and advancing the site through the Remedial Investigation (RI)/FS process. The target date for successful completion of the FS is September 30, 2000.

Preliminary Findings

A workshop was convened on December 15, 1999, among Weyerhaeuser, Ecology, and CH2M HILL staff to review the key findings of the MTCA RI completed in April 1999. The workshop also provided a framework for completing the FS. The following preliminary findings were identified in this meeting.

- Various cleanup activities at the Chlor-Alkali Plant have occurred since the 1970s. In 1974, a consent decree was negotiated between Weyerhaeuser and EPA Region 10 for closure of the No. 1 Cell Room and conversion of the mercury cells in the No. 2 Cell Room.
- After 1976, mercury was no longer used at the plant.
- Ecology ranked the site and published the ranking in its Hazardous Sites List.
- As a result of the listing, Weyerhaeuser conducted an RI according to the requirements of MTCA.

Previous Remedial Actions

Since 1972, numerous remedial actions have been implemented at the Chlor-Alkali Plant to remove or contain mercury sources and impacted materials. These areas of remediation are shown in Figure 2.

A summary of the major remedial actions completed to date follows:

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- Removal of approximately 10,000 tons of brine sludges in 1972, 1973, and 1974 from the former surface impoundment area and removal of another 24,000 tons of brine sludges, pond liners, and subsoil in 1976 and 1977.
- Removal of sixty-one 55-gallon drums of mercury-contaminated dust, debris, water, sludge, and elemental mercury from the No. 1 Cell Room in 1990.
- Removal of approximately 2 tons of soil containing visible mercury from the brine spill area in 1990.
- Removal of 1,308 tons of concrete and rebar following demolition of the No. 1 Cell Room mezzanine floor and interior concrete columns in 1990.
- Removal of 4,912 tons of concrete floor slab and decomposer pads, and underlying soils from the former No. 1 Cell Room building in 1991. An estimated 1,485 pounds of elemental mercury were recovered as a result of this action.
- Installation of a polymer modified asphalt (PMA) pavement over soils containing residual mercury in the former No. 1 Cell Room area.
- Additional removal of approximately 117 tons of soil from the brine spill area in 1991, along with the recovery of 10 pounds of elemental mercury and removal of 15 feet of concrete drainage ditch and abandoned pump bases.
- Recovery of approximately 5 pounds of mercury from the interior of the instrument shop, located in the maintenance area, in 1991.
- Demolition of the No. 1 Cell Room building shell and roof with the removal of 4,305 tons of concrete, wood, transite siding, and soil in 1991.
- Removal of 8,148 tons of soil and concrete from outside and beneath the No. 1 Cell Room building in 1991.
- Closure of the former No. 1 Cell Room area through placement of clean backfill, construction of a rainwater collection system, and PMA pavement in accordance with a 1991 Agreed Order with Ecology.
- Removal of approximately 36 tons of soil and concrete following the 1991 demolition of a sump in the basement of the No. 2 Cell Room building.
- Removal of approximately 36 tons of soil from mercury hotspots identified near the No. 2 Cell Room and in the brine treatment area in 1991.
- Removal of approximately 1,166 tons of soil in the former diffuser area as part of the No. 1 Cell Room diffuser removal action in 1992.

As a result of these actions, mercury contaminant sources at the Chlor-Alkali Plant have been substantially remedied, reduced, recycled, or in the case of residuals, contained. Consequently, the associated human health and environmental risks posed by the site have been greatly diminished.

Feasibility Study Purpose

Under MTCA, the purpose of an FS is to develop and evaluate cleanup action alternatives to ensure a suitable alternative is selected for a site. While not explicitly referenced in MTCA, Remedial Action Objectives (RAOs) are constructive in defining a framework for identifying suitable cleanup actions, consistent with the MTCA remedy selection process.

Weyerhaeuser collected valuable site data during numerous investigations, including the RI. This information is being used to develop RAOs for the site. Based on these data, preliminary RAOs for the Chlor-Alkali Plant will focus on groundwater. Site data do not suggest the need to establish RAOs for surface water, sediment, or soil.

Feasibility Study Scope of Work Requirements

An FS scope of work should focus on the environmental media and pathways most likely to demonstrate a human health or environmental risk. Media, or pathways, that do not pose a human health or environmental risk based upon available and acceptable data should be eliminated from further consideration.

Consistent with MTCA, if concentrations of hazardous substances do not exceed the cleanup level at a standard point of compliance, no further action is necessary (173-340 (8)(a)). RI site data suggest that either (1) sediments, surface water, and soil do not contain mercury at levels that pose a threat to human health or the environment, or (2) the pathway of exposure to these media is not complete or available.

Environmental Media

Data supporting the above reasoning are presented and discussed below for each medium. A more thorough presentation of site data and a comparison to MTCA cleanup levels are available in the report entitled *Ecology Draft Remedial Investigation Report: Chlor-Alkali Plant, Longview, Washington* (CH2M HILL, April 1999).

Sediments

Numerous historical investigations of mercury contamination in Columbia River sediment have been conducted at or near the Chlor-Alkali Plant. Details of these investigations, sample locations, and mercury concentrations are presented in Appendix I of the *Remedial Investigation and Feasibility Study Work Plan* (CH2M HILL, May 1995), the draft RI Report, and the technical memorandum entitled *Weyerhaeuser Chlor-Alkali Plant: No. 2 Cell Room Diffuser Sediment Sampling* (CH2M HILL, June 10, 1999).

It is important to remember that sediments possibly impacted by past site operations are no longer present because self-scouring conditions prevent sediment deposition adjacent to the facility. Recall that in 1976, Weyerhaeuser discontinued the use of mercury processes at the facility. Then in 1980, Columbia River conditions changed significantly following the volcanic eruption of Mount St. Helens. The eruption deposited a large amount of sediment into the river which was subsequently dredged. When the navigational channel was restored, the width was 200 feet less than before the eruption. Some of the dredge spoils were disposed of near the east powerhouse, creating a spit. The narrower channel and the presence of the spit have increased flow velocities in the river, reducing sediment deposition and creating a self-scouring environment.

Available analytical information characterizing sediments include the following:

- In 1986, 15 surface sediment samples were collected from various locations ranging from 6 miles upstream to 4 miles downstream of the plant. Background mercury concentrations ranged from below the detection limit of 0.2 milligrams per kilogram (mg/kg) to 0.26 mg/kg. Sediment collected adjacent to the Chlor-Alkali Plant indicated that mercury concentrations were equal to or lower than those found in background sediment. One exception was a single sample obtained near the salt dock with a mercury concentration of 0.73 mg/kg.

- In 1987, three sediment samples were collected adjacent to the downstream portion of the facility. Mercury was below the detection limit (0.2 mg/kg).
- In 1988, two additional samples were collected in the same area as the 1987 effort. Mercury was below the detection limit (0.02 mg/kg) in one sample and at the detection limit in the other.
- Ecology collected two samples downstream of the facility in 1990, with results of 0.018 mg/kg and less than 0.011 mg/kg. A background sample collected upstream of the facility contained mercury at 0.008 mg/kg.
- In 1992, the No. 1 Cell Room diffuser and outfall were removed. Before the diffuser was removed, mercury concentrations in sediment surrounding the diffuser ranged from less than 0.2 mg/kg to 0.6 mg/kg. (After removal of the diffuser, concentrations from the same area increased from 0.3 mg/kg to 7.2 mg/kg, although these samples are suspected of representing material within the diffuser rather than actual sediments.)
- In 1998, additional samples were obtained during the RI in response to the mercury results obtained near the former No. 1 Cell Room diffuser. Samples were collected from 17 locations within the vicinity of the former No. 1 Cell Room diffuser. Of the 17 samples, only 2 samples exceeded the detection limit (0.1 mg/kg) and each yielded a concentration of only 0.2 mg/kg. Thus, the anomalous results obtained from this area in 1992 were not confirmed.
- In May 1999, 13 additional RI surface sediment samples were collected near the No. 2 Cell Room diffuser, which has been abandoned but not removed. Only 2 of the 13 samples exceeded the detection limit (0.1 mg/kg), yielding mercury concentrations of only 0.2 mg/kg and 0.4 mg/kg.

Currently, the Washington State *Draft Sediment Management Standards* (WAC 173-204, December 1998) do not contain numerical criteria for freshwater sediments. The current numerical criteria for mercury remains the marine sediment quality standard of 0.41 mg/kg. Possible freshwater sediment quality values are being considered by Ecology and include values ranging from 0.41 mg/kg to 0.56 mg/kg based upon Microtox and oyster biological affects (Ecology Publication 97-323a, July 1997). These values are consistent with the current marine standard.

According to the current and proposed Sediment Management Standards, sediments with chemical concentrations equal to or less than the sediment quality standard (0.41 mg/kg) do not have adverse effects on biological resources or pose a significant threat to human health.

Since available facility sediment data at the plant do not exceed this standard, sediments will not be addressed in the FS.

Surface Water

Surface water characterization at the Chlor-Alkali Plant consists of samples collected from the Columbia River (adjacent, upstream, and downstream of the plant) and stormwater samples from the facility's eastern drainage ditch, the only drainage that discharges directly to the river. The Columbia River data, collected from 1970 to 1998, are discussed in more detail in Appendix I of the RI/FS Work Plan and in the draft RI Report. The data are summarized below.

- Of the 36 Columbia River surface water samples, only one yielded a concentration above the detection limits (ranging from 0.02 µg/L to 0.5 µg/L.). This sample was collected adjacent to the site in 1971 and contained a mercury concentration of 1.0 µg/L. Mercury has not been detected in surface water in any of the nine samples collected adjacent to the plant since that time.

- During the RI, surface water samples were obtained from the stormwater ditch during three separate storm events. Mercury was not detected in any of the three stormwater samples above the detection limit (0.2 µg/L).

The Washington State Water Quality Standards for acute and chronic freshwater exposure (WAC 173-201A) were used to compare these analytical results. For aquatic organisms, the standards are 2.4 µg/L for acute exposure and 0.012 µg/L for chronic exposure. The detection limits from the various sampling events were low enough to determine that mercury was not present at concentrations exceeding the freshwater acute water quality standard, but not low enough to ascertain that mercury was below the freshwater chronic standard.

Because of this uncertainty, Weyerhaeuser evaluated historical biotissue data collected near the site. These data are presented in Appendix I of the RI/FS Work Plan and show that total mercury concentrations in fish tissue collected in the vicinity of the facility since 1971 have not exceeded the 1.0 mg/kg action level for methylmercury established for fish and shellfish by the U.S. Food and Drug Administration in the *Fish and Fishery Products Hazards and Controls Guide* (February 16, 1994). This action-level is the basis for the chronic exposure water quality standard. The biotissue results indicate that a source of bio-available mercury that could accumulate in fish is not present.

Since acute exposure criteria have not been exceeded and biotissue data do not indicate that bio-available mercury is accumulating in fish and shellfish tissue, surface water will not be evaluated in the FS.

Soil

Mercury in Chlor-Alkali Plant soils (other than natural background concentrations) is due to historical releases in or near the former surface impoundment area, staging area, former No. 1 Cell Room, No. 2 Cell Room, brine spill area, caustic storage area, loading and liquefaction areas, brine treatment area, and west area. These areas were discussed in the RI/FS Work Plan and are identified in Figure 2.

The use of mercury at the plant ceased in 1976 when all processes and equipment using mercury were converted to mercury-free processes or removed. Therefore, there are no current mercury sources at the Chlor-Alkali Plant.

Previous remedial actions at the site have resulted in the removal of soils with mercury concentrations greater than 260 mg/kg, which was the Resource Conservation and Recovery Act (RCRA) high-mercury treatment subcategory threshold concentration in 1991. These remedial actions are documented in the approved RI/FS Work Plan and draft RI Report. Areas of remaining concern identified in the RI/FS Work Plan are covered with either asphalt, buildings, or equipment, with the exception of portions of the west area and the former surface impoundment area. These two areas were sampled during the RI to better assess mercury concentrations.

In addition to the RI, extensive soil data have been collected at the Chlor-Alkali Plant in the past 20 years from at least 13 separate investigations. With the completion of numerous remedial actions at the site, the available soil data now consist of more than 270 soil samples representing current site conditions.

The current and anticipated future land use of the site is industrial, the site is currently zoned for heavy industrial land use, and adjacent land uses are industrial. Thus, the MTCA Method C industrial soil cleanup level of 1,050 mg/kg for worker protection applies to the site.

The MTCA Method C soil cleanup level of 1 mg/kg for protection of groundwater is potentially applicable to the site. However, the areas of concern are covered by buildings, paved, or capped,

preventing groundwater recharge through impacted soil. Thus, since groundwater recharge does not occur through the impacted soil, the cleanup level for protection of groundwater does not apply.

Under MTCA, the site is considered to have met the cleanup standard and is considered clean if the following three conditions are met:

1. The 95 percent upper confidence limit (UCL) mean concentration is less than the cleanup level.
2. No single sample has a concentration greater than twice the cleanup level.
3. No more than 10 percent of the samples exceed the cleanup level.

As seen in Table 1, the soil data indicate that the numerous remedial actions conducted at the site have successfully lowered site soil concentrations below the cleanup level. All areas of the site meet the three conditions outlined above and the cleanup level has been attained. Additionally, capping and paving throughout the site, and security and access restrictions prevent contact with impacted soil.

TABLE 1
Chlor-Alkali Plant Soil Data—Current Conditions

Soil Area of Concern	Number of Samples	Number of Detects	Maximum Concentration (mg/kg)	95% UCL Mean (mg/kg)	Exceeds Twice the Cleanup Level	10% of Samples Above Cleanup Level
Brine Spill Area	13	13	189	85.4	No	No
Brine Treatment	25	25	118	46.9	No	No
Caustic Storage	32	30	185	29.5	No	No
Former No. 1 Cell Room	117	111	634	57.3	No	No
Former Surface Impoundments	20	20	169	39.7	No	No
No. 2 Cell Room	35	35	72.8	23.9	No	No
Staging Area	5	5	40.9	33.8	No	No
Stormwater Ditch	5	5	4.8	3.33	No	No
West Area	19	19	16	5.26	No	No
All Samples	271	263	634	38.1	No	No

Because previous remedial actions at the site have resulted in attainment of the applicable MTCA soil cleanup level for mercury at all areas of concern, soil will not be addressed in the FS.

Groundwater

Groundwater occurs in saturated portions of the alluvial and basalt aquifers at the Chlor-Alkali Plant. The Columbia River, which borders the edge of the site, forms the base for the local and regional hydrologic systems. Groundwater beneath the site discharges to the Columbia River and the river stage has only a minor influence on groundwater levels beneath the site.

There are 21 groundwater monitoring wells at the facility and a considerable amount of data have been generated from regular monitoring of these wells since 1987. A complete presentation of the groundwater data at the site can be found in the draft RI Report. Sitewide groundwater data continue to be updated annually as part of the ongoing groundwater monitoring program.

The sitewide groundwater data indicate that, in general, mercury concentrations in groundwater are steady or decreasing with time; the rate of decrease is slowest in the area of the former No. 1 Cell Room and the former surface impoundments. Except for these areas, mercury concentrations are at or below the maximum contaminant level (MCL) for mercury of 0.002 mg/L.

Possible explanations for the slow rate of decrease in mercury concentrations in certain wells include the following:

- The amount of groundwater flux (and, therefore, the rate of flushing) is limited because the asphalt cap reduces rainfall infiltration and the transmissivity of the basalt and the alluvium above the basalt is very low.
- It is possible that small amounts of elemental mercury may be present below the water table as isolated globules in basalt fractures and pore spaces. If present, these globules could serve as an ongoing source of dissolved mercury in groundwater.
- Transient fluctuations in mercury concentrations may occur as a result of unusually high rainfall conditions that may coincide with an elevated water table. It is likely that mercury concentrations in groundwater beneath the former No. 1 Cell Room and former surface impoundments will continue to decrease slowly in the future.
- Concentrations in groundwater are not expected to increase with time because the initial mercury sources were removed from the plant more than 23 years ago. The results from soil and groundwater sampling suggest that leaching of mercury from soil to groundwater by infiltration and percolation of precipitation is not a major factor influencing mercury concentrations in groundwater.

Note that mercury has not been detected in groundwater upgradient of the No. 1 Cell Room and former surface impoundment area. The mercury discharge to the Columbia River from groundwater is estimated to be approximately 9.6 ounces per year. Essentially all of this is discharged from the alluvium; the basalt zone contributes approximately 0.03 percent of this total.

In summary, groundwater sampling results have shown that mercury concentrations are below the MCL in all areas of the site except the former No. 1 Cell Room and former surface impoundments areas. In these areas, recent groundwater sampling indicates mercury concentrations in alluvial and basalt groundwater range from below the detection limit of 0.0002 mg/L up to 0.1420 mg/L, exceeding the groundwater MCL of 0.002 mg/L. Due to exceedances of the MCL, groundwater will be addressed in the FS.

Summary

Current environmental site characterization data indicate that groundwater is the only medium at the site with mercury concentrations in excess of applicable regulatory criteria. Consequently, the FS scope of work will focus on groundwater and the development of RAOs to address groundwater concerns.

References

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